

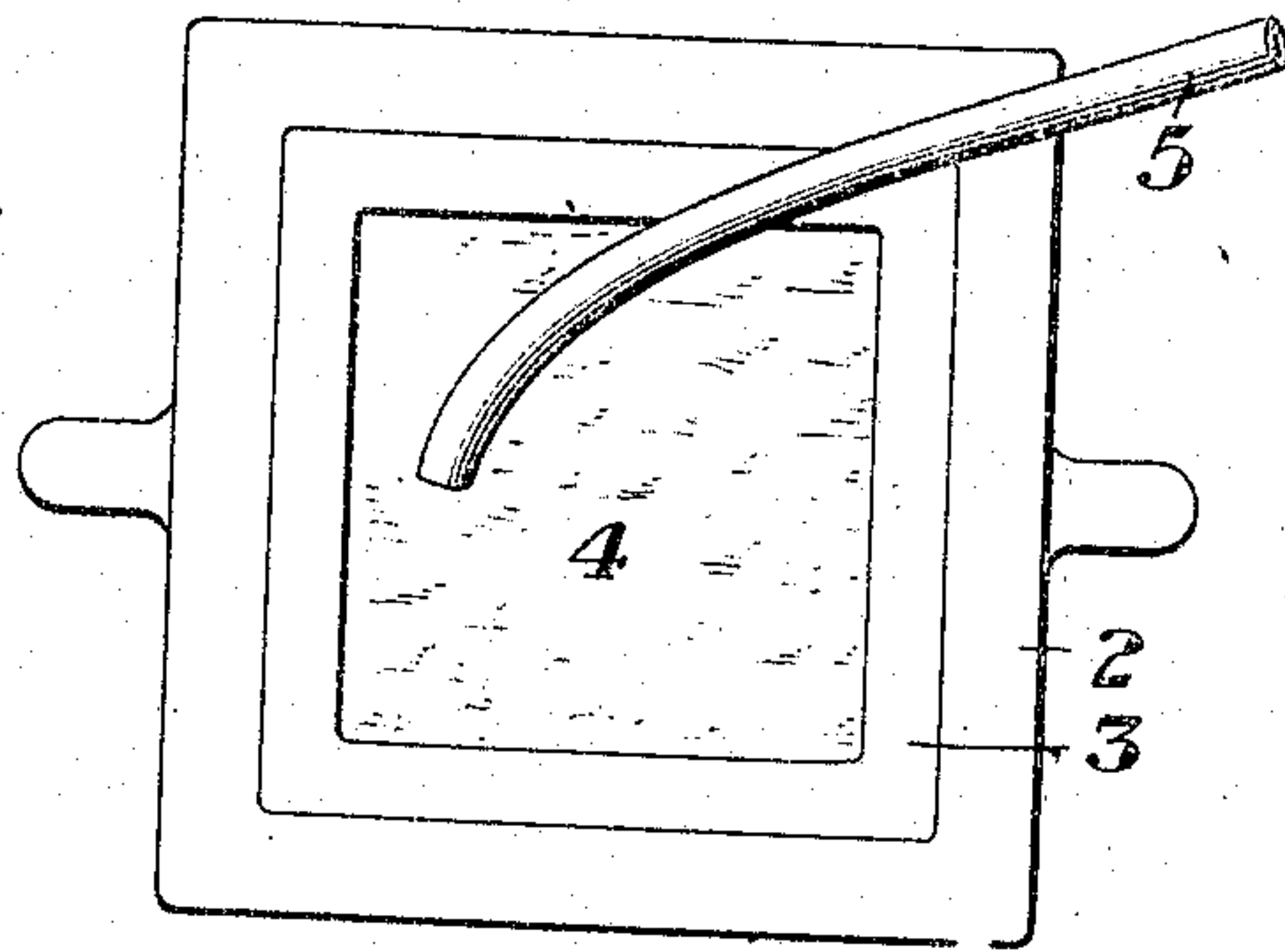
937,163.

F. E. MESTA.  
METHOD OF MAKING CASTINGS, INGOTS, AND THE LIKE.  
APPLICATION FILED OCT. 10, 1906.

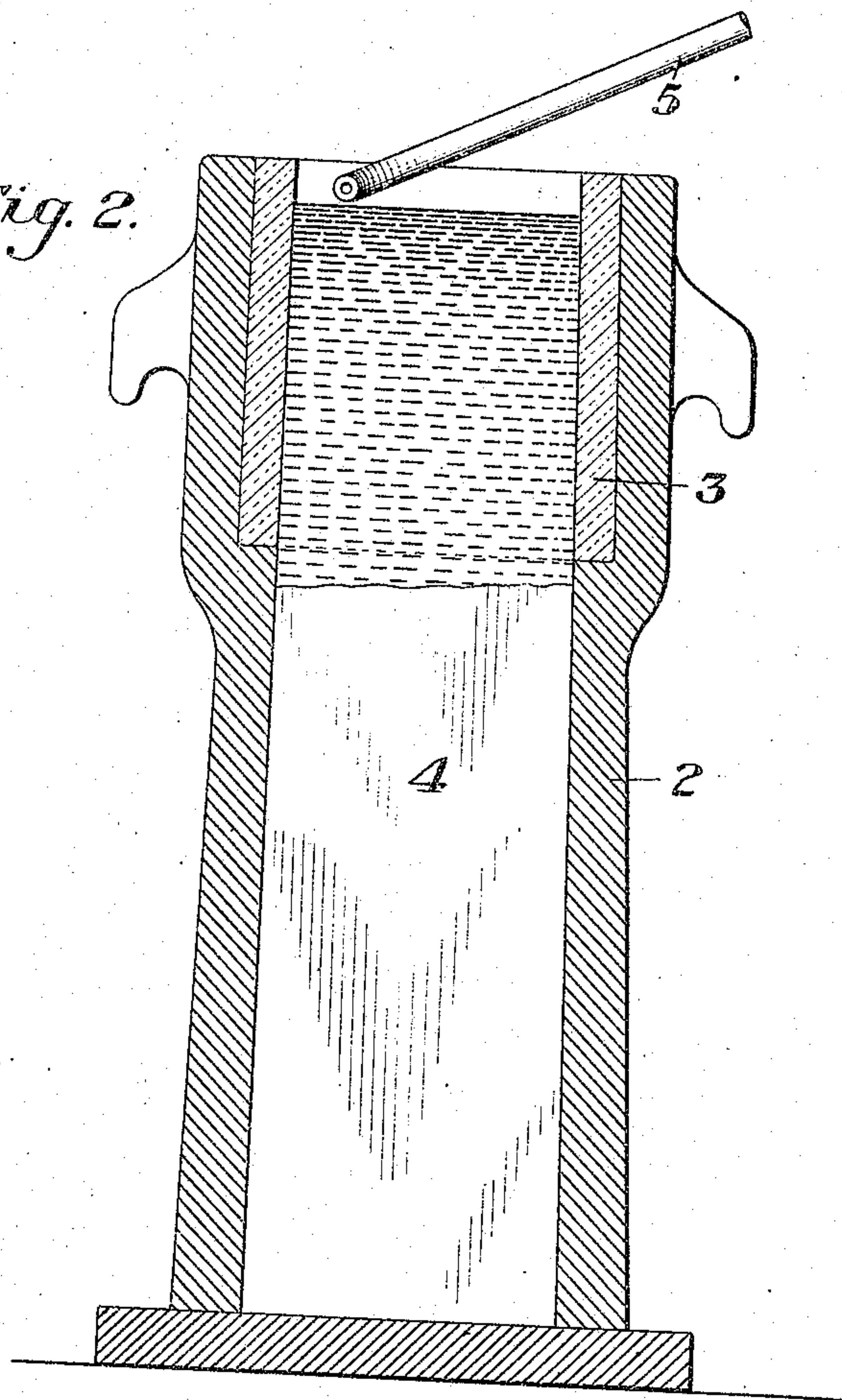
Patented Oct. 19, 1909.

3 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



WITNESSES

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Fig. 3.

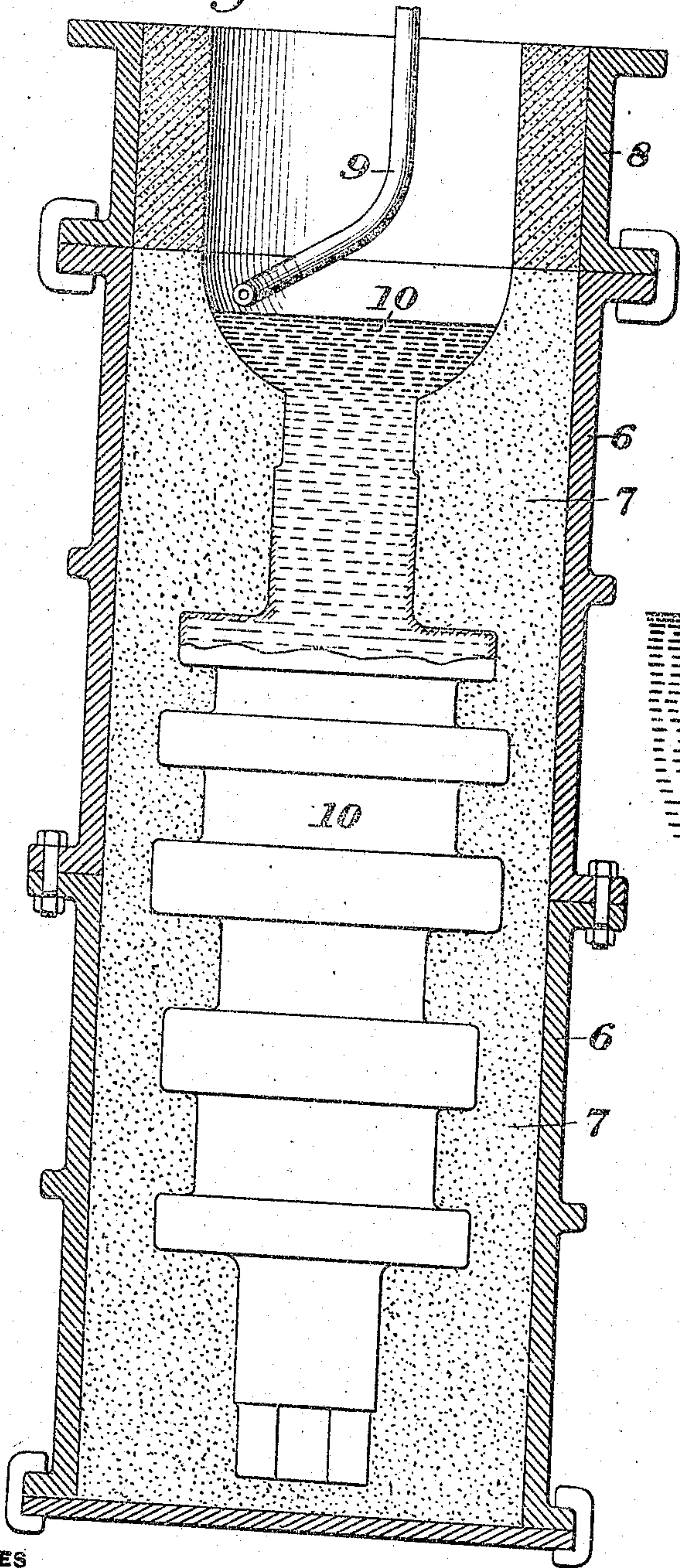
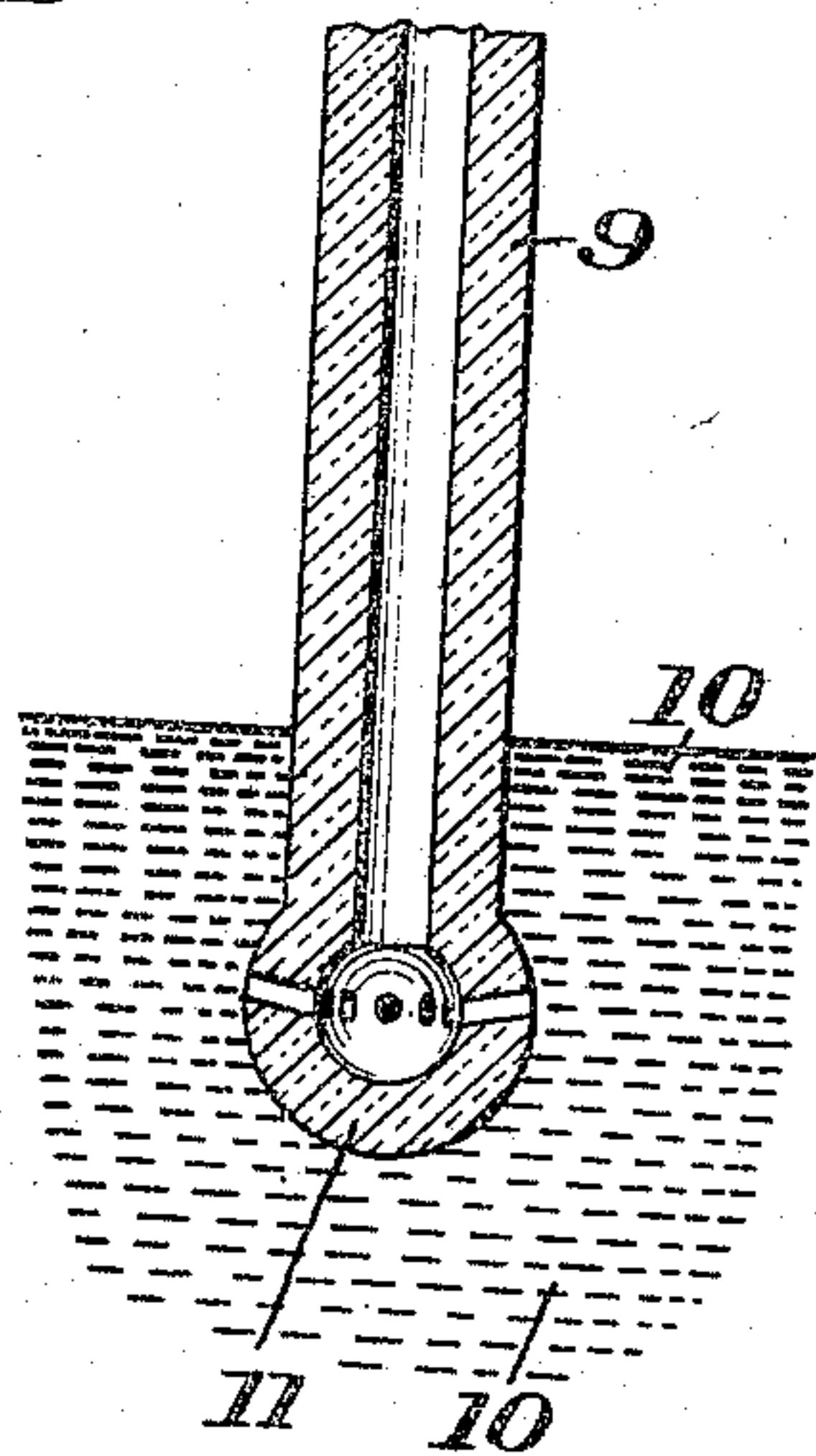


Fig. 4.



WITNESSES

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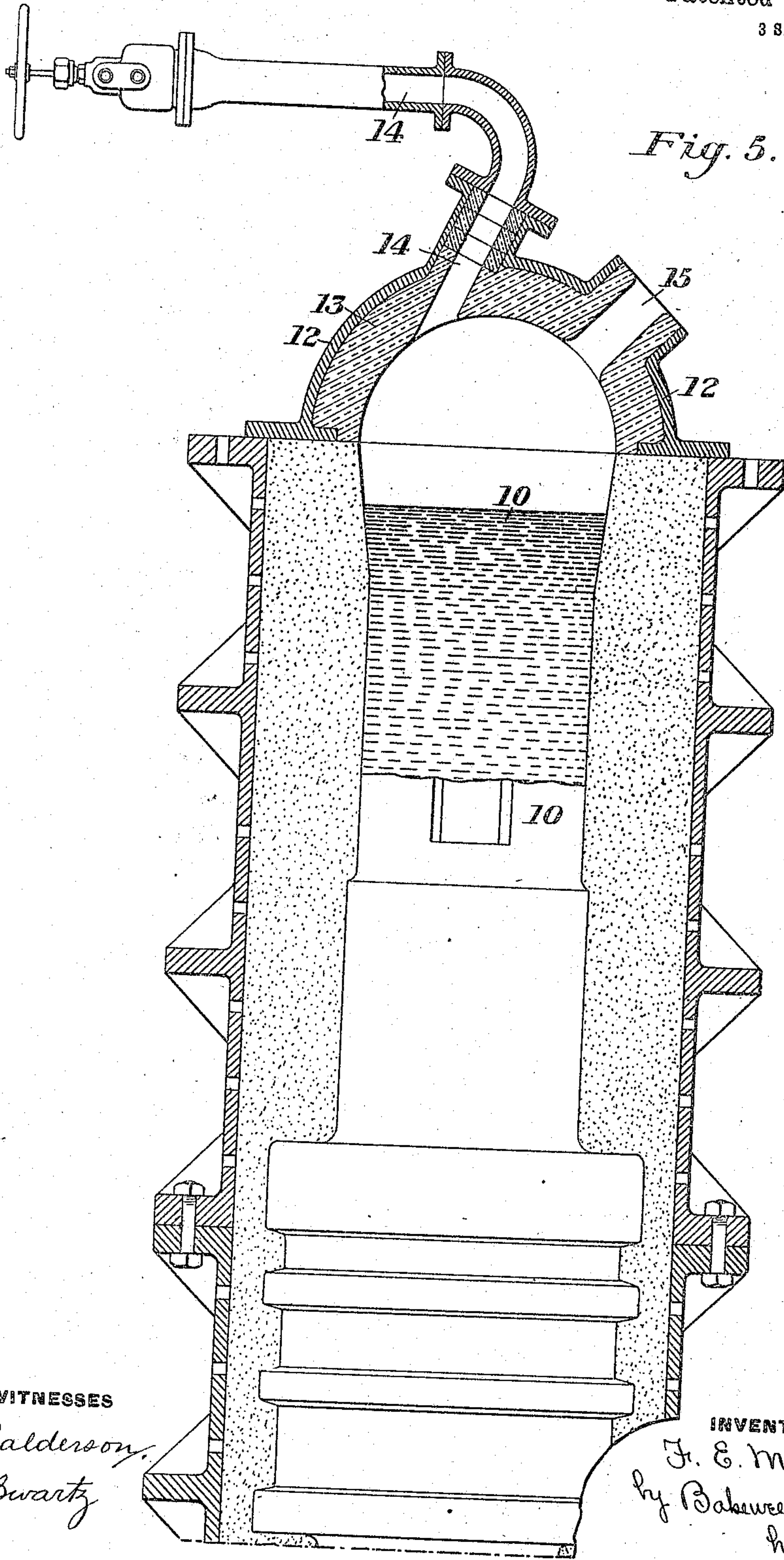
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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METHOD OF MAKING CASTINGS, INGOTS, AND THE LIKE.

937,163.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed October 10, 1906. Serial No. 338,261.

*To all whom it may concern:*

Be it known that I, FREDERICK E. MESTA, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Method of Making Castings, Ingots, and the Like, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are respectively plan and sectional views illustrating the application of my method to the treatment of an ingot; Fig. 3 is a vertical section showing the application of my invention to the treatment of a roll casting; Fig. 4 is an enlarged sectional view showing modified means for supplying air to the metal; and Fig. 5 is a sectional view illustrating another method of carrying out my invention.

My invention relates to a method of making castings for the purpose of preventing the formation therein of "pipes" or holes, and to enable the production of castings which shall be more solid and homogeneous than heretofore, especially in the upper portion thereof.

My invention is also designed to provide a method of this character which can be practiced at a comparatively small expense and without the use of expensive or cumbersome apparatus.

As is well known great difficulty has heretofore been experienced in obtaining castings, particularly castings of considerable size, which are free from pipes or holes at the upper interior portions thereof, or at those portions where the metal cools last; such pipes or holes being caused by the gradual cooling of the metal from the outside toward the center, the resulting contraction leaving an interior space or hole at that portion which is the last to cool. This cooling and contraction also set up strains in the castings, particularly where they are of irregular or non-uniform section. In my improved method, I overcome these difficulties by supplying heat in the upper portion of the casting after it has been poured and while it is cooling, whereby such portion is maintained in a fluid condition for a sufficient period of time to enable the casting to be fed with fluid metal as it cools. This heat may be supplied in various ways, as by means of gas or other burners or heaters

applied to the flask or mold. I prefer, however, to utilize for this purpose the heat generated by the combustion of silicon or carbon, or other combustible element or elements, contained in the cast metal itself, and for this purpose I blow air thereon or therein, the oxygen of which combining with the combustible elements of the metal may generate sufficient heat to maintain the fluid condition of the metal at a temperature as great as, or greater if desired, than its initial or pouring heat. This air may be either warm or cold, and may be supplied from any convenient source, such as a pump or compressor.

In order to prevent change in the chemical composition of the metal thus treated, due to the combustion of some of its elements, I preferably feed the casting during the blowing operation with some material which will supply the necessary ingredients, such as high-silicon pig, or manganese, the character and amount of such material fed being of course dependent upon the nature and composition of the metal being cast.

My improved method is particularly applicable to steel castings, but it may also be used to advantage with cast iron, brass and other metals.

In the drawings, I have illustrated the manner in which my invention is practiced.

The numeral 2 in Figs. 1 and 2 designates an ingot mold which is in general of the usual character, but it is preferably provided at its upper portion with a refractory lining 3 for the purpose of enabling it to withstand the heat which is applied to or generated in the adjacent portion of the casting.

4 designates the body or ingot which is cast in the mold, and 5 is an air supply pipe. This pipe is preferably directed downward and at one side, so as to cause the air to penetrate the metal with a whirling action. The nozzle portion of this pipe may be a sleeve or nozzle of fire clay or other refractory material connected to a pipe or hose leading from any suitable source of air supply.

Fig. 3 illustrates the application of my improved method to a roll casting. In this figure 6 designates the flask in which is formed the sand mold 7. 8 designates a separate head or flask section in which is



formed a sink head for the casting. 9 designates the air supply pipe, and 10 is the roll being cast.

Instead of directing the air against the surface of the molten metal as indicated in Figs. 2 and 3, the air may be discharged within the body of metal as shown in Fig. 4, in which the numeral 10 designates the molten portion of the casting being treated, and 11 a perforated blowing head of refractory material which is connected with a suitable source of air supply.

Fig. 5 illustrates another method of carrying out my invention. In this figure, the numeral 12 designates a hood of cast iron or other suitable material which is provided with a lining 13 of fire brick, clay, or other refractory material. 14 is an inlet pipe, by means of which hot or cold gas or air or a mixture of the same may be blown into the hood. 15 is an opening for the burned gases to escape. The advantage of the hood is that it retains more of the heat in the upper portion of the casting and also results in less oxidation of the metal by preventing it from contact with the open air. Less slag will also be formed.

As soon as the casting has been poured, the hood is placed over the upper end of the flask, and the electrode 20 is placed in the upper end of the runner or spout. The circuit is then closed, which forms an electric arc between the end of the carbon electrode and the upper end of the casting. By this means a very high heat can be obtained, and the upper end of the casting maintained in a liquid state until its lower end is practically cooled, thus allowing the liquid metal to flow downward as the cooling and contracting of the main body of the roll takes place.

The method herein described should be applied to castings as soon as possible after the pour has been completed. By thus maintaining the metal in the upper portion of the casting, or in the sink head, in a fluid condition, while the main portion of the casting is cooling, the solidification of the casting is caused to take place from the bottom upward, and there is produced a solid casting substantially free from pipes and other internal defects.

My invention is applicable to castings of all descriptions. In the case of castings having several recesses or sink heads, heat may

be applied to each of them in the manner described.

What I claim is:—

1. The herein described method of casting which consists in pouring the mold and maintaining portions of the charge in a fluid condition by the generation of heat therein, while other portions of the charge are cooling; substantially as described.

2. The herein described method of casting, which consists in pouring a mold, and supplying air and the necessary ingredients to a portion or portions of the cast metal after it has been poured for the purpose of creating combustion therein; substantially as described.

3. The herein described process of casting, which consists in pouring a mold and creating a combustion in portions of the cast metal while other portions thereof are cooling, to thereby maintain the first named portions in a fluid condition, and during such operation feeding the casting with material adapted to supply metalloids thereto; substantially as described.

4. The herein described method of casting, which consists in pouring a mold and supplying air to portions of the charge while other portions are cooling, to thereby cause a combustion within that portion to which air is supplied, and feeding material to the fluid portion of the charge to compensate for the losses due to the combustion; substantially as described.

5. A step in the art of making castings, which consists in generating heat within that portion of the charge which cools last so as to maintain the same in a molten condition while the remaining portions are cooling, substantially as described.

6. A step in the art of making castings, which consists in supplying air and the necessary ingredients to the molten portion of the charge for the purpose of creating combustion therein thereby maintaining said portion in a molten condition while other portions of the charge are cooling, substantially as described.

In testimony whereof, I have hereunto set my hand.

F. E. MESTA.

Witnesses:

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H. M. CORWIN.